



Fig 1: Red squirrel found in the Treborth Botanical Gardens, Bangor, with signs of squirrelpox

Gross postmortem examination under the APHA Diseases of Wildlife Scheme recorded periorbital hair loss, and reddening and thickening of the skin, which was more severe around the left eye. There was swelling and reddening of the lips, with the lower lips severely affected, and mild crusting of the affected skin below the left nostril.

Transmission electron microscopy confirmed the presence of SQPV particles. Bacteriological culture of a skin swab revealed a mixed bacterial flora containing a very heavy growth of *Staphylococcus sciuri*. It was previously reported that *S sciuri* was isolated in pure or predominant growth from ocular squirrelpox lesions in 16 of 42 animals for which bacteriology was undertaken, and highlighted four of these cases suggesting a role as a secondary pathogen.<sup>2</sup>

Following confirmation of squirrelpox at the Treborth Botanical Gardens, trapping operations were undertaken between 5 and 9 December. Six grey squirrels were removed and 11 individual red squirrels identified. Three red squirrels were PIT microchipped following their capture, while eight had previously been microchipped. All were first microchipped after the last squirrelpox outbreak: three in autumn 2021 and five during 2022. None of the captured red squirrels showed external signs of

**“  
This new  
and discreet  
squirrelpox  
outbreak on  
the mainland  
highlights  
the ongoing  
threat posed  
by grey  
squirrels  
to regional  
red squirrel  
conservation**”

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potential disease. Two camera traps were also deployed and monitored by local volunteers. The recorded videos and still images were carefully scrutinised and again, none of the recorded animals showed signs of disease.

This ongoing mainland monitoring programme is vitally important to detect further outbreaks of disease. The surveillance is providing valuable data on the frequency of outbreaks and, with microchipped animals, the unique opportunity to potentially assess scale. Given the close proximity of Anglesey, with the bridges linking the island with the mainland near to the Treborth Botanical Gardens, the strategic value of ongoing vigilance cannot be overstated.

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#### References

- Shuttleworth CM, Everest D, Holmes P, et al. An opportunistic assessment of the impact of squirrelpox disease outbreaks upon a red squirrel population sympatric with grey squirrels in Wales. <https://bit.ly/3VEKjhg> (accessed 30 January 2023)
- Duff JP, Haley P, Wood R, et al. Causes of red squirrel (*Sciurus vulgaris*) mortality in England. *Vet Rec* 2010;167:461

## POULTRY HEALTH

### Use of ionophores in poultry feed

IN their assessment of the impact of a reduction or removal of ionophores used for controlling coccidiosis in the UK broiler industry, Parker and colleagues deem the development of antibiotic resistance linked to use unlikely, and the negative economic and environmental impact of removal high.<sup>1</sup> We believe some important considerations have not been taken into account in coming to these conclusions.

Resistance to ionophores has now been demonstrated in both coccidia and bacteria. The fact that ionophores are not used in human medicine does not mean there are no risks to consider. Genes encoding the resistance mechanism in bacteria are found on transferable plasmids that also encode resistance to other antimicrobials. Co-occurrence of ionophore resistance with resistance to aminoglycosides, macrolides, tetracyclines and vancomycin has been reported.<sup>2,3</sup> These antimicrobials are important in human healthcare. In both Sweden and Norway, all vancomycin-resistant *Enterococcus faecium* (VRE) isolated from broilers in the past 20 years are also resistant to narasin, suggesting ionophores can be linked to persistence of VRE in broilers.<sup>4,5</sup>

It is often assumed that *E faecium* strains are host specific, and that strains found in animals do not pose a threat to human health; however, VRE from broilers have been shown to transiently colonise people,<sup>6</sup> providing the opportunity for horizontal gene transfer of resistance genes. A detailed look at whole genome sequencing data from two large collections of enterococci reveals that ionophore-resistance genes are part of the core genome of broiler isolates, but they are also found in isolates from hospital patients at low prevalence.<sup>7,8</sup> In the case of vancomycin resistance, there is also evidence for transfer of plasmid-borne resistance from enterococci to *Staphylococcus aureus*.<sup>9</sup>

Parker and colleagues promoted the common argument that a reduction of use of in-feed ionophores will require an increased use of clinically relevant antibiotics to treat infections. In contrast to this, the Norwegian in-feed ionophore-free broiler rearing programme has not seen increased use of clinically relevant antibiotics since its implementation in 2016.<sup>10</sup>

Taken together, the (indirect) risks posed by ionophore use to human health appear higher than accounted for. These risks have not been costed into any of the models presented. The true cost to human health, when continuing business as usual, may ultimately surpass the estimated impact of reduction or removal of ionophores.

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#### References

- 1 Parker D, Lister S, Gittins J. Impact assessment of the reduction or removal of ionophores used for controlling coccidiosis in the UK broiler industry. *Vet Rec* 2021;189: e513
- 2 Naemi AO, Dey H, Kiran N. NarAB is an ABC-type transporter that confers resistance to the polyether ionophores narasin, salinomycin, and maduramicin, but not monensin. *Front Microbiol* 2020;11:104
- 3 Pikkemaat MGR, Rapallini MLBA, Stassen JHM, et al. Ionophore resistance and potential risk of ionophore driven co-selection of clinically relevant antimicrobial resistance in poultry. Wageningen University and Research. 2022. <https://bit.ly/3XDFZK9> (accessed 16 January 2023)
- 4 NIPH. NORM and NORM-VET: Usage of Antimicrobial Agents and Occurrence of Antimicrobial Resistance in Norway. NIPH and The Norwegian Veterinary Institute. 2020. <https://bit.ly/3iGuJy2> (accessed 16 January 2023)
- 5 SVA. SVARM 2011. Swedish Veterinary Antimicrobial Resistance Monitoring. The National Veterinary Institute. 2012. <https://bit.ly/3Xh7y2N> (accessed 16 January 2023)
- 6 Sorum M, Johnsen PJ, Aasnes B, et al. Prevalence, persistence, and molecular characterization of glycopeptide-resistant enterococci in Norwegian poultry and poultry farmers 3 to 8 years after the ban on avoparcin. *Appl Environ Microbiol* 2006;72: 516–21
- 7 Arredondo-Alonso S, Top J, McNally A, et al. Plasmids shaped the recent emergence of the major nosocomial pathogen *Enterococcus faecium*. *mBio* 2020;11: e03284–19
- 8 Pontinen AK, Top J, Arredondo-Alonso S, et al. Apparent nosocomial adaptation of *Enterococcus faecalis* predates the modern hospital era. *Nat Commun* 2021;12:1523
- 9 De Niederhausern S, Bondi M, Messi P, et al. Vancomycin-resistance transferability from VanA enterococci to *Staphylococcus aureus*. *Curr Microbiol* 2011;62:1363–7
- 10 NIPH. NORM and NORM-VET. Usage of Antimicrobial Agents and Occurrence of Antimicrobial Resistance in Norway. NIPH and The Norwegian Veterinary Institute. 2021. <https://bit.ly/3Xmk1m4> (accessed 16 January 2023)

#### DANIEL PARKER AND STEPHEN LISTER RESPOND

WE thank the authors for their interest in our paper but would like to highlight some significant omissions and what we consider to be misrepresentations of the existing data and science.



The authors say that ‘resistance to ionophores has now been demonstrated’; however, this terminology is incorrect. There are no established clinical breakpoints for ionophores, and isolates with elevated minimal inhibitory concentrations (MICs) should not be referred to as ‘resistant’ as this implies clinical resistance. Data reported in national programmes interpret susceptibility data using epidemiological cut-off values, not clinical breakpoints.<sup>1</sup>

Nilsson and colleagues published papers investigating the relationship between vancomycin-resistant *Enterococcus faecium* (VRE) and increased MICs to narasin, as referenced by the letter authors. However, they fail to acknowledge that Nilsson et al concluded in their most recent paper: ‘This would mean that the use of narasin has probably slightly increased concomitantly with the decreased occurrence of VRE among Swedish broilers described in this study. All of this taken together, the hypothesis that use of narasin plays a role in persistence of vancomycin resistance among enterococci in Swedish broilers is weakened.’<sup>2</sup>

This is further supported by the conclusions in the SVARM report<sup>3</sup> on the monitoring of VRE in Sweden that there are no indications that the presence of VRE in broilers in Sweden has affected the situation in Swedish healthcare.

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**Ionophore coccidiostats are a valuable tool in the toolbox of solutions to control coccidiosis in commercial poultry**

It is well recognised that *E faecium* strains are host specific, but that they can transiently colonise other species, including people. However, it is misleading to then reference Arredondo-Alonso and others<sup>4</sup> to imply that resistance genes may be transferred when these authors state that the clones of *E faecium* and the plasmids that carry resistance genes that infect broilers and people are distinct, and that clones found in broilers are not relevant in human medicine.

The authors accuse us of promoting the common argument that reduction of the use of in-feed ionophores will lead to an increased use of clinically relevant antibiotics, but this is the experience of practising poultry veterinarians from many countries where in-feed ionophores have been removed. Antibiotic use may not have increased in Norway, but a clear deterioration in broiler health, with significant increases in mortality and carcass condemnations, was demonstrated in Norway between 2014 and 2017 following the removal of ionophores.<sup>5</sup> Researchers and veterinarians commenting on the results of USA no-ionophore programmes conclude that the increased welfare and mortality risks would necessitate the increased use of antibiotics.<sup>6,7</sup>

As a profession we are encouraged to move to more ‘evidence-based’ practices, an approach championed by



this journal. Ionophore coccidiostats are a valuable tool in the toolbox of solutions to control coccidiosis in commercial poultry. Removal will have significant impacts on the health and sustainability of broiler production.<sup>8</sup> While co-occurrence between increased MICs to ionophores and some antibiotic resistance genes have been reported, the evidence to date is that this has no significant impact on human healthcare.

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#### References

- 1 Bywater R, Silley P, Simjee S. Antimicrobial breakpoints, definitions and conflicting requirements. *Vet Microbiol* 2006;118: 158–9
- 2 Nilsson O, Alm E, Greko C, et al. The rise and fall of a vancomycin resistant clone of *Enterococcus faecium* among broilers in Sweden. *J Glob Antimicro Resist* 2019;17:233–5
- 3 Aspevall O, Bergfeldt V, Billström H, et al. Swedres-Svarm 2020. Sales of antibiotics and occurrence of resistance in Sweden. Public Health Agency of Sweden and National Veterinary Institute. 2020. <https://bit.ly/3ZCLOjv> (accessed 16 January 2023)
- 4 Arredondo-Alonso S, Top J, McNally A, et al. Plasmids shaped the recent emergence of the major nosocomial pathogen *Enterococcus faecium*. *mBio* 2020;11: e03284–19
- 5 van Horne P, van Harn J. Socio-economic aspects of a change in coccidiosis control programme in broiler diets in the Netherlands. Wageningen University and Research. 2019. <https://bit.ly/3Wg5V43> (accessed 16 January 2023)
- 6 Karavolias J, Salois M, Baker K, et al. Raised without antibiotics: impact on animal welfare and implications for food policy. *Transl Anim Sci* 2019;2:337–48
- 7 Singer R, Porter L, Thomson D, et al. Raising animals without antibiotics: US producer and veterinarian experiences and opinions. *Front Vet Sci* 2019;4:52:1–13
- 8 Gittins J, Wynn S, Parker D, et al. The economic and environmental impacts of removing ionophore coccidiostats from the UK broiler sector. *World Poult Sci J* 2022;78:41–56

## PROFESSION

### Veterinary valentines

AN ode to the people who make this job great.

You remind me to keep breathing when my bitch spay is bleeding. You shove a square or two of chocolate



in my mouth when I look like I need feeding. You know exactly when to pull my leg and when to hand out a hug. You consistently hit the veins I can't, yet never look smug.

You offer gentle guidance when repeatedly failing to intubate a rabbit. Before I even think to ask for the 2 metric vicryl, I turn around and there you have it. You've picked me up when I've crashed my car into a ditch. You've scratched my nose when I'm scrubbed up and it's started to itch.

You've helped me with cow caesareans in wee hours of the morning. You've brought me the embryotomy wire when I've forgotten it for dehorning. You've bought salt and vinegar crisps on a Friday. Just to make sure we don't get hangry.

You've kept me company and invited me for Sunday lunch when I was on my own. You've cooked me Christmas dinner when I was on call and a long way away from home. You've answered FaceTime when you're off work and I am faced with a bleeding bitch spay. You've bought me tins of mojitos at the end of a long day. You've looked at x-rays pinged across WhatsApp at midnight...replying just to let me know you agree with me and the heart really does look alright!

So during this time filled with love hearts and red roses, don't forget to show some love to the low-key heroes under our noses.

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**During this time filled with love hearts and red roses, don't forget to show some love to the low-key heroes under our noses**

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## WILDLIFE MANAGEMENT

### Fate of hunted foxes

IN response to the last sentence in Martin Whitehead's interesting letter regarding gamebirds (*VR*, 7/14 January 2023, vol 192, pp 38–39), we would like to point out that hunting foxes with hounds did not leave wounded survivors. They were either dispatched quickly or escaped uninjured.

**Elizabeth Rhys-Jones, Louisa Cheape**, committee members

**DJ Renney**, chairman

**Aoife Bakonyi Byrne**, secretary

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## DEATH NOTICES

**Brudenall** On 19 October 2022, Denise Kathryn Brudenall (née Lambert), MA, VetMB, MVS, MACVSc, FACVSc, CertVR, CertVOphthal, MRCVS, of Woffdene, Queensland, Australia. Dr Brudenall qualified from Cambridge in 1987.

**Duckhouse** On 12 January 2023, John Leonard Duckhouse, BVSc, MRCVS, of St Thomas, Barbados. Dr Duckhouse qualified from Bristol in 1974.

**Windsor** On 22 November 2022, Roger Stanley Windsor, BVM&S, MRCVS, MBE, of Dumfries, Dumfries and Galloway. Dr Windsor qualified from Edinburgh in 1963.